LOCKYER AND CROOKES.

The Latest Sensations in Science.

THE ALCHEMIST OF THE FUTURE.

Solution of Solar Mysteries -The Ultra-taseous World of Matter.

MOLECULAR CONSTRUCTION.

LONDON, Jan. 14, 1879. The recent discoveries of Mr. J. Norman Lockver. F. R. S., have made a sensation in the scient orld, but it is due to that gentleman to say that long ago he prepared us for the startling announce ment he has lately made, that all the chemical elements can probably be reduced to hydrogen. According to Mr. Lockyer all matter is brought to its most rarefied state through a door so narrow that hydrogen done can enter.

Five years ago, in a communication to the eminen French chemist, M. Dumas, Mr. Lockyer suggested "that the elements themselves, or at all events some of them, are compound bodies." In that letter, dated ember 3, 1873, he wrote as follows:-

"It seems that the hotter a star is the simpler appears its spectrum, and that the metallic elements appear in the order of their atomic weights.

'Thus we have:-Some very brilliant stars, where we see only bydrogen in an enormous quantity and magnesium.

"Second"—Some colder stars, like our sun, where we

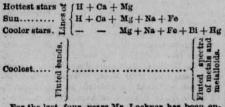
"Hydrogen + magnesium + sodium, hydrogen + magnesium+sodium+calcium+iron; in these stars no

"Third-Some stars, colder still, in which all the metallic elements are associated, where their lines are no longer visible, and where we have only the spectra of the metalloids and their compounds.

Fourth-The older a star is the more the liberated hydrogen disappears; on the earth we no longer find

hydrogen at liberty.
"It seems to me that these facts prove many ideas advanced by you. I have thought that we might imagine a celestial dissociation which continues the ork of our furnaces, and that the metalloids are compounds which are dissociated by the sun's heat. while the metallic monatomic elements, whose atom weights are least, are precisely those that resist the temperature even of the hottest stars.'

Since then calcium has found a place between hydrogen and magnesium in the solar spectrum, and the photographs of Dr. Huggins give it the same relative place in respect of the stars. According to Mr. Lockyer the arrangement may be given as fol-



For the last four years Mr. Lockyer has been engaged in preparing an immense map of the solar spectrum, for which already more than one hundred thousand observations have been made and 2,000 photographs have been aken. The complete spectrum is twenty rods long, and much care has been taken to map the metallic lines in the most accurate manner and to purify the spectra. In some of the photographs a record has been made of the long and short lines of the spectra. In others vapors have been compared with the sun or with each other. Impurities in the spectrum were traced in the following manner:—Supposing, for example, an impurity of manganese was to be sought for in iron. If the longest of Mn was found to be absent the short lines were also absent, on the supposition that the so-called elements are irreducible. If the longest line appeared the impurity had to be traced to the shortest

reduction of all these photographs, giving the results of all these observations of metallic spectra compared with the Fraunhofer lines, was begun by Lockyor early in 1878, and during this work, which engaged his attention for six months, he beent spectra.

stances called elements are in fact elementary Mr. Lockyer says that the results of his observations of stallic spectra brought him to a state of hopeless confusion. He then determined to try the other hypothesis-viz., that the so-called elements are compound. "Obviously," he says in his paper to the Royal Society, "the first thing to be done was to inquire whether one hypothesis would explain these thort line coincidences which remained after the reduction of all the observations on the other. Calling, for simplicity's sake, the short lines common to many spectra basic lines, the new hypothesis, to be in which basic molecules, representing bases of the ao-called elements, should give us their lines, varying in intensity from one condition to another, the

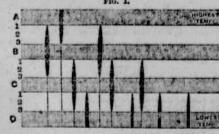
conditions representing various compoundings.
"Suppose A to contain B as an impurity and as an element, what will be the difference in the spectroscopic result? 'A in both cases will have a spectrum of its own.

"B, as an impurity, will add its lines according to the amount of impurity.

"B, as an element, will add its lines according to the

amount of dissociation.
"The difference in the phenomena, therefore, will be that, with gradually increasing temperature, the spectrum of A will fade, if it be a compound body, as it will be increasingly dissociated; and it will not fade if it be a simple one. Again, on the hypothesis that A is a compound body—that is, one compounded of at least two similar or dissimilar molecular groupings-then the longest lines at one temperature will not be the longest at another; the whole fabric of 'impurity elimination' based upon the assum single molecular grouping falls to pieces, and the origin of the basic lines is at once evident."

by a diagram. He assumes a series of furnaces—A, E, C, D—of which A is the hottest:—

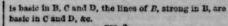


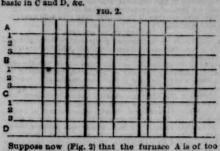
Assuming that in A (Fig. 1) there is a substance a by itself capable of forming a compound body B by union with itself or another substance at a lower temperature. He next assumes a furnace B, where this compound body exists alone. The only spec trum visible in B would be that of the compound B just as the spectrum of the supposed elementary

Let C be a furnace of still lower temperature, having in it a more compound substance, g. The spectrum of the compound substance, g would be the only one visible in C.

Throwing, then, into the hottest furnace A, some of the donely compounded body g, the lines of g will heat be thickest, then those of B, and a would finally be the only one remaining, giving a spectrum of the

greatest simplicity.
On account of incomplete dissociation the strong lines of B will be seen in the furnace C, and the strong lines of g will be seen in the furnace D, respectively, but only as faint lines. Each line is represented in D that appears in C; but the intensities of the lines are entirely antike in Cami D. The line of a strong in A.





low a temperature to dissociate the compounds $B,\,g$ and d into a, but yet is higher than B in temperature. Each line now is basic for the four furnaces, and the spectrum of substances in the A furnace will have the same number of lines as the spectrum of sub-stances as they exist in the D furnace. The only difference will be in the relative thickness of the lines. "Let us suppose," says Mr. Lockyer, "that the four furnaces represent the spectra of iron, broken up into different finenesses by suc-cessive stages of heat. It is, first of all, abundantly served will vary according as the temperature resem-bles that of A, B, C or D. The positions in the spectra will be the same, but the intensities will vary. This is the point. The longest lines, represented in the diagram by the thickest ones, will vary as we pass from one temperature to another. It is on this ground that the whole fabric of impurity elimination must fall to pieces on such an hypothesis. Let us suppose, for instance, that manganese is a compound of the form of iron represented in furnace B, with semething else; and suppose again that the photograph of iron which I compare with manganese represents the spectrum of the vapor at the rity of iron in manganese, as I have eliminated it, we begin the search by looking for the longest ngest lines shown in the photograph of iron and strongest lines shown in the photograph of iron in the photograph of manganese taken under the same conditions. I do not find those lines. I say, therefore, that there is no impurity of iron in manganese, but, though the longest iron lines are not there, some of the fainter basic ones are. This I hold to be the explanation of the apparent confusion in which we are landed on the supposition that the elements are elementary."

ments are elementary.

Mr. Lockyer next applies this line of argument to the dissociation of substances known to be compound. While the spectrum of the metal calcium consists of lines which increase in thickness and number as the quantity of the metal is increased the spectrum of a sait of calcium consists principally of fluted spaces and bands, increasing, however, in the same way. Both spectra have long and short lines. Each has a simple spectrum in proportion to the quantity. The number of true metallic lines that appear in the spectrum of a sait of calcium, for example, indicate the quantity of the metal resulting from the dissociation, and these inetallic lines increase as the channelled bands of the compound diminish.

Having found a satisfactory explanation of the basic lines as actually observed, the next inquiry was to ascertain how on the principle of evolution various bases might be formed and then become "basic" themselves. The bases might increase in complexity by a process of multiplication, or they might become more complex by adding molecules of different of line. The former might be represented by A+B, the latter method by A+B. A third state of complexity brought about by the addition of another molecule of B would be represented by A+B2. If certain lines are peculiar to certain substances, and are generally visible in the several spectra, does not each become basis in turn as the temperature is changed?

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not each become basis in turn as the temperature is changed?

Mr. Lockyer endeavored to solve this question by the examination of the spectra of calcium, iron, lithium and hydrogen first, and afterward by examining those of other substances. A record of these last he has not yet given forth. First he ascertained that the molecular grouping of calcium which gave a spectrum, having its chief line in the blue, was nearly broken up in the sun (and quite broken up when a large coil and jar was used) into other lines in the violet part of the spectrum. He has placed parallel to each other several spectra taken from photographs, giving the blue end only. First, calcium, with chlorine, with low temperature, gives a spectrum without any lines in the blue, the compound molecule vibrating as a whole with a spectrum at the red end; second, with the hast of an induced current the single line of calcium appears at the right; third, when the heat is increased and a weak electric are is used two lines appear at the left and a thick line at the right, which reverses itself, in the fourth case, the number of cells being increased, two lines appear at the left and a thick line at the right, which reverses itself, in the fourth case, the number of cells being increased, iwo lines appear at the left and one at the right, all reversing themselves. In the fifth case a coil and small jar is used, and the lines, one on the right and two on the left, appearing in the same relative place in the spectrum, are no longer reversed, but show clear. In the sixth case, with a large coil and large jar, the two lines at the left appear and the line on the right is no longer visible. In the seventh case is represented the spectrum of the absorption of calcium vapor in the sun.

It is argued, since with the lowest temperature only the single line appears when slight separation of the compound molecule takes place, and with the highest temperature consumed the interest of the absorption of calcium vapor in the sun.

The argument is continued with re hanged?

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without limit.

The argument is continued with respect to calcium—"We are justified in supposing that our calcium, once formed, is a distinct entity, whether it be an element or not, and therefore by working at it along we should never know whother the temperature produces a single simpler form or a more atomic condition of the same thing, or whether we actually break it up into x+y, because neither x nor y will ever vary. But if calcium be a product of a condition of relatively lower temperature, then in the stars hot enough to enable its constituents to exist uncompounded we may expect these constituents to vary in quantity. There may be more of x in one star and more of y in another; and if this be so then the "H" and "K" lines will vary in thickness, and the extremest limit of variation will be that we shall only have H representing, say x in one star, and only have K representing, say x in one star, and only have K representing, say x in one star, and only have in which, though both H and K are visible, It is thicker in some and K is thicker in others."

Professor Stokes did not at first regard the facts brought forward by Mr. Lockyer as conclusive proof of the dissociation of the molecule of calcium, although he accepted it as evidence of the high temperature of the sun. He thought it would be in accordance with analogy that in an incandescent surface the same phenomena would appear as when a platinum wire is made incandescent by the electric current, except that the spectrum would be discontinuous—the radiation of each refrangibility absolutely increasing and the proportion of the higher to the lower increasing with the increase of temperature. He supposed A, B, C, D and E to represent very bright lines of increasing refrangibility in the spectrum of a vapor. At a low temperature A ought to the lower increasing with the increase of temperature C might be the brightest and most persistent, and at a still higher temperature C might be the brightest and most persistent, and at a still higher temperature C m

He supposed A. B. C. D and E to represent very bright lines of increasing refrangibility in the spectrum of a vapor. At a low temperature A ought to be the brightest, but with a higher temperature C might be the brightest and most persistent, and at a still higher temperature E. Dr. Huggins, however, having taken photographs of the spectra of certain stars was able materially to strengthen Mr. Lockyer's theory. Indeed, the line which should have been most conspicuous in the spectrum of Sirius presumably a hotter star than our sun), in case Processor Stokes' view was correct, was so faint it could scarcely be seen at all. The H line in Sirius set down to the one molecular grouping of calcium is thick; another K line due to another molecular grouping, which is a thick line in the spectrum of our sun, does not yet appear at all in Sirius.

Dr. Huggins also took a photograph of the spectrum of a Aquilae and found a line corresponding to the K line of the solar spectrum which does not appear in the spectra of a Lyrs and Sirius. The spectrum of calcium at different temperatures are compared with each other, viz.—In Sirius, a Aquilae, the sun, the voltsie are and in flame. Sirius, representing the hottest temperature, the H line in its spectrum is very prominent. In the cooler temperature of a Aquilae the K line appears thick. In the next cooler temperature of the sun the K line still appears thick, but falls off in thickness in the next lower temperature of the sun the K line still appears thick, but falls off in thickness in the next lower temperature of the sun the K line still appears thick, but falls off in thickness in the next lower temperature of the sun the K line still appears thick, but falls off in thickness in the next lower temperature of the sun, the sun the K line still appears thick, but falls off in thickness in the next lower temperature of the sun. The blue appears thick in the arc, while the K line appears thick in the arc, while the K line appearance of most of the line of less retrangibility is

dail, dated November 7, 1861, is referred to. He first in the lester speaks of his surprise at seeing a magnificent blue band for the first time in the spectrum of lithium. Thinking the lithic chloride must be adulterated with strontium be testedit, and found it was not adulterated. Whence did the blue band arise? From the lithium, the cone points or the ignited air? Dr. Frankland concludes by saying:—"When lithium wire burns in air it emits a somewhat crimson light; plunge it into oxygen and the light changes to bluish white. This seems to indicate that a high temperature is necessary to bring out the blue ray." The postscript of this letter, November 22, 1861, says:—"I have just made some further experiments with the lithium spectrum, and they conclusively prove that the appearance of the blue line depends entirely on the temperature. The spectrum of lithic chloride, ignified in a Bunsen's burner fame, does not disclose the faintest trace of the blue line; replace the Bunsen burner by a jet of hydrogen (the temperature of which is higher than that of a Bunsen burner), and the blue line appears, faint, it is true, but sharp and quite unmatakable. If oxygen now be slowly turned into the jet the brilliancy of the blue line increases until the temperature of the flame rises high enough to fuse the plainum, and thus put an end to the experiment."

The hydrogen spectrum presents some carious phenomena. Dr. Frankland and Mr. Lockyer in 1869 noticed that the li line, so called by Angstrom, and due to the absorption of hydrogen, was not to be seen when low temperatures were employed, and concluded, therefore, that it indicated a comparature. They next ascertained that the extremely complicated spectrum of hydrogen could be reduced to one line in the green corresponding to F in the solar spectrum with the employment of certain temperature and pressure.

The observations of the sun's eclipse in 1875 made by Professor Young help out Mr. Lockyer's ideas materially. When the hydrogen lines were most brilliant he calcium li

hydrogen lines indicated a probable reduction of temperature, calcium lines began to appear, and when the hydrogen lines were quite absent they were conspicuous in the spectrum of the corona.

In the spectrum of iridium the strongest line is one of the lines of hydrogen (h), which has been con-sidered as an indication of relatively high tempera-ture. The other hydrogen line (near G) is absent in this spectrum.

sidered as an indication of relatively high temperature. The other hydrogen line (near G) is absent in this spectrum.

We give Mr. Lockeyer's own account of an experiment with metallic indium:—

"A glass tube, with two platinum poles about half an inch apart, was employed. Through this tube a slow current of air was driven, after passing through a U tube one foot high containing calcie chloride, and then through sulphuric acid in a Wolf's bottle. The spectrum of the spark passing between the platinum electrodes was then observed, a coil with how Grove cells and a medium sized jar being employed. Careful notes were made of the brilliancy and thickness of the hydrogen lines, as compared with those of air. This done, a piece of metallic iridium, which was placed loose in the tube, was shaken so that one part of it rested against the base of one of the poles and one of its ends: at a distance of a little less than half an inch from the base of the other pole. The spark then passed between the iridium and the platinum; the red and blue lines of hydrogen were then observed both by my friend, Mr. G. W. Hemming, and myself. Their brilliancy was most markedly increased. This unmistakable indication of the presence of hydrogen, or rather of that form of hydrogen when gives us the hine alone associated into that form which gives us the blue and red lines, showed us that in the photograph we were not dealing with a physical coincidence, but that in the arc this special form of hydrogen had really been present; that it had come from the iridium, and that it had registered itself on the photograph; plate, although ordinary hydrogen persistently retuess to do so."

A piece of palladium charged with hydrogen gave no line of hydrogen in iridium was distinctly recorded.

Mr. Lockyre as A Man AND A sciency as to the work on the residence for "good them that the work in parts in the distant future, to fit it for a place of residence for "good americans."

Mr. Lockyre as A Man AND A sciency and it has a professor that presearches a

Alluding to his own researches in science Mr. Lockyer said he had great difficulty in making the necessary scientific phrascology in an article he was writing for the Noncenth Century simple enough. "You will have to publish a dictionary with it,"

said I.

"Yes," said he, "and a grammar, too." He thought it would take a long time, at least half a century, for scientific men to complete these researches. The whole study of nature by means of the spectroscope is yet in its infancy. The voltaic arc must be used in future, instead of the electric spark, in the spectroscopic examination of different substances in the laboratory, and photographic records must take the place of observations. The work of one man in this line of inquiry he considers as but a drop in the occum.

line of inquiry he considers as but a drop in the ocean.

In a paper which will soon be read before the Royal Society Mr. Lockyer throws light on questions which puzzled observers of the solar eclipsethis year. He has called that region of the sun situated above the photosphere, in which various colored appearances display themselves during eclipses, the chromosphere. Very brilliant at times are these limes of the chromosphere, especially in sun storms. They appear in every part of the sun's circumference, and the longest ones have been considered due to hydrogen, coinciding, as several of them do, with certain of the Fraunhofer lines which have been referred to that so-called element. It has been usual for astronomers for the last ten years to account for these lines by supposing the

circumerence, and the longest ones have been considered due to hydrogen, coinciding, as several of them do, with certain of the Frannhofer lines which have been referred to that so-called element. It has been usual for astronomers for the last ten years to account for these lines by supposing the injection of iron vapor or other metallic vapors into the chromosphere from the body of the sun.

From comparison of numerous observations made by several eminent astronomers—among them Professor C. A. Young, of the United States—Mr. Lockyer has concluded that astronomers have been mistaken in thus accounting for the lines in the solar chromosphere, and, following out the reasoning employed in previous papers, he has obtained evidence that the bright lines in the solar chromosphere are chiefly lines due to the not yet is clated bases of the so-called elements. He considers that the solar phenomena in their totality are in all probability due to dissociation at the photospheric level, and association at higher levels. In this way the vertical currents in the solar atmosphere both ascending and descending, the intense absorption in sun spots, their association with the zacular, and the apparently continuous spectrum of the coron and its structure find an easy solution."

"Professor Young came near to it," said Mr. Lockyer to me. Professor Young writes as follows:—

"Two explanations suggest themselves. The first, which seems rather the more probable, is that the metals operated upon by the observer who mapped their spectra were not absolutely pure; either the inferent metals as renders them susceptible of certain synchronous periods of vibrations—a resemblance as regards the manner in which the militaries to establish between them an important physical (and probably chemical) relationship."

It may be remarked that it is difficult to say what changes in the processes of spectrum analysis may be effected by the recent developments of science; but it chaimed for the new method, which is based on the laterned body of savant

his articles are marked by clearness of expression as well as depth of thought.

NOT A SPIRITUALIST.

The attack which has been made upon him in the columns of a Chicago journai he characterizes as unjust, and the statements repeteding his alleged complicity with a certain spiritualist medium he calls a pack of lies from beginning to end. He said to me in his laboratory, when I requested him to give me the facts:

in his laboratory, when I requested him to give me the facts:—
"i am not a spiritualist. I could not, however, heattate to examine scientifically His Satanic Majesty himself if he were to come in here."
I pictured to myself the aforesaid degenerate personage with a strong induction coil attached to his caudal barb, while the Professor, turning a spectroscope full on the flashing Satanic eye, discovers a very blue-black line in the green.
Mr. Grookes continued:—
"Nothing is beneath the investigation of science, and I hold spiritualism to be a subject for rational

The question is often asked, What practical result can come from such scientific researches? And many people think that men learned in such things might better devote their time and talents to matters that seem more nearly to concern the human race. But who can tell to what one trifling discovery, or one that at first seems trifling, may lead? If it may not at first seem important to know that all the chemical elements can be reduced to infinitesimal molecules this knowledge may prepare the way for some discovery of the greatest possible value. But, after all, science only asks, What is truth? and men of science have ever expended and will continue to expend every energy in the pursuit of knowledge, if only for its own sake.

ARCTIC DISCOVERY.

[From the London Observer.] Arctic expeditions may be roughly classified under one of two heads. Either their aim is to open up els of communication through the icy waters of the Polar Seas or to attain the barren honor of reaching farther north than any previous exof reaching farther north than any provious explorers have been able to penetrate. To the former category belong such enterprises as those of Franklin, of Nordenskiold and the projected expedition to Hudson's Bay. To the latter belong, among others, the attempt of Captain Nares and the journey for which Commander Cheyne, B. N., is now endeavoring to procure the requisite funds. Putting aside, however, the vexed questions of the utility of a visit to the North Pole, the project of Commander Cheyne deserves some attention, if only for the neveity of the means by which the gallant officer hopes to attain his end. After serving under Sir James Ross, Captain Elliott and Captain Austin in three several Arctic expeditions, Commander Cheyne has come to the conclusion that the North Pole, unattainable as it seems by ships, may, after all, be reached by means of balloons, which would come into use when the ice barred all further progress by sea. The advantages to be obtained by this method are sufficiently-obvious, but it is doubtrul whether they would not be more than counterbalanced by the additional risks attending aërial locomotion. Whether the result, even in case of success, would repay the cost and danger incurred is, too, as we have said, at least questionable. However, this is a point for Commander Cheyne and his supporters to determine, and if the latter are sufficiently numerous to start the expedition we can only wish the explorers all success and a happy return from their hazardous journey. plorers have been able to penetrate. To the former

FATHER PELLETTER.

THE PUNERAL SERVICES OVER THE BEMAINS TO TAKE PLACE THIS MORNING AT ST. FRANCIS

XAVIER'S CRURCH. Little remains to be added to the tragic story of the death of Father Pelletier, who died suddenly while performing a marriage ceremony at the Church of St. Francis Xavier, in West Sixteenth street, on Wednes day evening. The body of the dead priest lay in the chapel of the church all day yesterday, where it was viewed by many weeping friends. The funeral will take place this morning. The office for the dead will be chanted at half-past seven o'clock, and at nine a solemn requiem mass will be offered, at which the Reverend Provincial will probably officiate. The remains of the deceased will be conveyed to the Novitiate burying place at West Park, near ada have been notified by telegraph of the sad event,

but none of them will be here in time for the funeral. The sudden death of Father Pelletier has produced a painful shock among the entire Catholic elergy, by whom he was universally loved and esteemed.

HIS DEATH PERDIPTED.

Father Merrick and Father Shoa, who were present when the tragic scene took place, said yesterday that the Herald's account was so full in all particulars as to leave hardly room for any additions. Father Shea said that Pather Pelletier did not die suddenly, but he lived about ten minutes. He fell with his eyes wide open, but perfectly speechless, and did not articulate a word. He was carried into the sacristy, where three physicians did their utmost to restore him, but all in vain. Then he received the sacrament from Father Shea. Dr. Wood, the house physician of the college, had correctly told him that he was liable to die at any moment from heart disease, and the deceased had fully realized his painful position for years past. Only a few days ago, while conversing with Father Shea on the much lamented illness of the reverend rector of the college, he said:—"Well, he is ready to go. It I were as ready as he is I shouldn't mind going, either!"

THE IMMEDIATE CAUSE.

The immediate cause of this sudden end was, in the opinion of Father Shea, the unusual excitement attending the ceremony. Father Pelletier was a man of phlegmatic appearance, but really of a very excitable and sensitive temperament. He had always led 8 very retired life, and had never been used to public assemblages. Moreover, Euglish was not his native tongue, he beling a French Canadian, and while he understood the language well he spoke it only with difficulty. He had never before officiated at a marriage cremony, and only consented to officiate on Wednesday evening because the groom was an old pupil of his, in whose wellare he took a deep interest. Me had because the groom was an old pupil of his, in whose wellare he took a deep interest. Me has we preparing to go out to the elter, and then betrayed little of the inward exci

JOSEPH COOK ON EDUCATION.

Rev. Joseph Cook lectured last evening in Association Hall on the question, "Does Death End All?" The lecture is an old one, having been delivered before in this city and reported in tion" Mr.. Cook began by saying that the present was an age of specialists, and therefore there was great danger of fragmentary culture. He then went on metaphorically to describe an imaginary vision with which he illustrated his theme. He dreamed, he said, that he wished to arrange all his books in the order of their topics. He placed them on fifteen shelves in the following order:-Mathematics, logic, rhetoric, following order:—Mathematics, logic, rhetoric, poetry, political economy, history, physics, chemistry, natural history, the fine arts, music, gymnastics, metaphysics, ethics and, finally, crowning the whole, the Christian erdences. These branches, he said, were all necessary parts of a liberal education. The attempt to leave out any part of them would be dangerous. Emptying the shelves of metaphysics and chica would be the source of doctrinal midifference in the present day. Leave out metaphysics and chica would be that young nen would grow up trained in all but the most important. In some western universities a man may receive his degree without studying either of those branches. For one he preferred colleges which required something more than an outline of those two branches rather than one which was entirely devoid of them. Every gap in native endowments was an inlet to eccentricity in one's spirit, and every gap in cuiture was an inlet to unsound conviction. The Christian evidences were tought in but few institutions and there in a vague way. The result was that college cluation cased to be a liberal one.

The lecturer concluded by referring to the plan advocated by William Cullen Bryant to establish public libraries with all the necessaries for a complete colucation. There would be many works, it is true, on each subject, but if one could not resal them all why not read offices books, one from each shell? Such culture would soon convince plain people that the Church was not arraid of science. If the young men of the present day were satisfied with an ordinary college training, and did not seek a complete education, let them beware of non-acadenic competition. poetry, political economy, history, physics, chemis

CORRECTING SENATOR BLAINE.

THE SHIPS, OFFICERS AND MEN IN THE NAVIES OF GREAT BRITAIN AND THE UNITED STATES.

TO THE EDITOR OF THE HERALD:-Will you permit an "outsider," having no connection with the navy, to say a 5 and in your valuable paper by way of correcting the remarkable statements of Senator Blaine, made a few days ago, on the passage of the Naval Appropriation bill in the Sen-ate? To have made the statement that there were over two thousand officers in the American navy to in all in the service, while in the British navy there are 4,990 officers, who manage 60,000 men and 491 ships, is not creditable in a Senator who is on the Committee on Naval Affairs, nor in fact for any man who attempts to speak on that subject. Now, with the royal navy list of July, 1878, before me, and the Navy Register of the United States for the same date, I extract from them the following facts in relation to the number of officers, ships and men in both at that

Interest on the active list of the navy, nor manned by sailors of the following officers of the line:—Admiruls, 19; vice admiruls, 18; rear admiruls, 29; capitains, 184; commanders, 20; starf commanders, 20; commanders, 20; commanders, 20; commanders, 20; commanders, 20; commanders, 20; in the Pay Department, 406; chaplains, 97; and the number of seamen are about 31,500, and not 60,000, as Mr. Hidne, asserts. This shows one officer of the line to every twelve seamen. In order to make up the 60,000 in the British may Mr. Biaine had to add all the solliers of the Royal Marine corps, both artiflery and light infantry, about 16,000 men; and where the remainder of the 60,000 could be obtained (except from the commanders, 20; commanders, 20; masters, 100; ensigns, 84; midshipmen, 44; making a total of 700 officers of the line of active starf commonders, 20; captains, 50; commanders, 89; lleutennatar commanders, 81; lleutenn

tain has only two or four even. She has one of vast capacity at Portsmouth and one at Devouport, one at Chatham, one at Shearness and one at Pembroke at home, while she has dockyards where any repairs can be made at Gibraitar, at Maits, at Halifax, at Bernuda, at Jamaics, at Cape of Good Hepe, at Ascension, at Trincomaice and at Hong Kong.

So that there is within the reach of every squadron of the British navy in every quarter of the globe the facilities for repairs.

of the British navy in every quarter of the globe the facilities for repairs.

So much for a comparison of the two services. And what now is most needed to regain our ancient position on the sea is not sensational speeches based upon ignorance of facts, but a suitable appropriation by Congress, every year, of money enough to build two or three ships of first rate cruising capacity, and to have some one besides politicians to see that it is honestly expended. It is a shame and a disgrace to the government that such large sums of money were wasted between 1865 and the accession of the present head of the Navy Department.

A CIVILIAN.

A TUMBLE IN NORTHWEST.

GREAT EXCITEMENT IN WALL STREET FOR LESS THAN HALP AN HOUR.

Old brokers in Wall street agreed that the excito-ment on the street and in the Stock Exchange yesment on the street and in the Stock Exchange yesterday, from a quarter past one o'clock until twenty minutes to two, was the greatest since the war. During that time there was a grand tumble in Northwest, the stock falling from 63% to 56. St. Paul stock was also affected. The downward movement was started, it is ciaimed, by H. K. Enos, William Heath and C. J. Osborn's brokers. For half an hour crowds of brokers and their assistants were seen hurrying through Wall street and vicinity as for dear life. When the fall in stocks commenced Delmonico's Broad street establishment was crowded, and the excitement's among the brokers was untense. In their anxiety to reach the Stock Exchange a rush was made for the doors, and one of the partitions in Delmonico's catablishment was forced from its place. Many brokers who were enjoying their lunch at the time rushed from their seats and made a scramble for the tape. The first person to secure it was kept busy calling off the figures for the benefit of the rest. At twenty minutes to two o'clock the excitement subsided somewhat, and Northwest stock began to recover until it reached 61. It afterward fell two points, and finally closed at 50%.

The "bull" movement was so strong that the bucket shops refused to do any business.

BUSINESS TROUBLES.

Frederick Lewis, assignce of Kaufmann & Blun, manufacturers of skirts, filed his schodules yester-day, showing actual liabilities, \$99,748 39; contingent liabilities, \$29,834 63; preferred claims, \$25,033 33; nominal assets, \$130,804 61; actual assets, \$42,353 72. At a meeting yesterday of the creditors of James C. Springsted, mason and builder, a statement was submitted, showing liabilities, \$10,000, and assets, \$6,000. The creditors failed to agree upon a settle-

\$6,000. The creditors failed to agree upon a settlement.

Morris H. Rieders, manufacturer of cigars, made an assignment yesterday to Julius Harlan, giving two preferences for \$188.65.

The following schedules of assignments were filed in the Court of Common Pleas:—Theodore Granbery to Edward Grunner. The liabilities are stated at \$17,813-13, nominal assets at \$17,845-50 and real assets at \$12,834-28.

Charles Knox, the hatter, who recently made an assignment for the benefit of his creditors to Charles F. Abbott, also filed his gehedules. Mr. Knox states his liabilities at \$307,827-75. His nominal assets are put down at \$410,211-80 and real assets at \$41,211-30.

. SMUGGLERS OVERHAULED.

hour yesterday morning 5,500 fine Havana cigars at a place in West street called the "House of Blazes." The cigars were packed inside of two India rubber bags, in which condition they were evidently thrown overboard and picked up by a small boat. The sunugglers, six in number, entered the West street premises, ran through to Washington street and es-caped.

premises, sax in number energy the street and escaped.

The same officers seized six cases (seventy-two bottles) of bay water, twelve bottles of brandy and twenty-four bottles of gin on board of the steamer City of Fara.

THE '68 PAPERS.

CONTINUATION OF THE CONGRESSIONAL IN-VESTIGATION OF COMMISSIONEE DAVENPORT'S

The Congressional Investigating Committee of the House of Representatives, appointed to inquire into and report upon the conduct of Supervisor of Elec-tions John I. Davenport, entered yesterday morning upon the third day of its labors. The large room where the proceedings are held was early crowded with politicians. Colonel Wingate appears on behaif of the pentioners, who "caused Congress to take action in the matter, while Mr. Davenport conducts

Adolph Zorrener was the first witness called. He resided on Eighty-eighth street, near Tenth avenue; arrived in this country in 1849, being then a boy; served seven years in the State militia, and served during the war in the Third New York cavalry, receiving an honorable discharge; went to the polling booth on election day to vote, but the moment he presented his ticket he was arrested and brought be-

fore Commissioner Davenport.

To Chairman Lynde—I would not have time to vote after they let me go; they took me around so I could not vote; I was told by one of the inspectors of election that my papers were all right, but still they would not let me vote.

By the Chairman-Then you did not vote? A. No sir; how could I?

Joseph Farrell, residing at No. 34 Henry street, came here in 1851; was naturalized October 5, 1868;

Joseph Farrell, residing at No. 34 Henry street, came here in 1851; was naturalized October 5, 1938; received a summons or notice to appear before Commissioner Davenport; attended Occause he was afraid of arrest; introduced himself to Davenport with his papers; he "hung on" to them; witness protested, and was informed that all voting on "68" papers would be arrosted; the Commissioner persisted in Keeping the papers, pledging himself that he would return them in eight days; came back in eight days; couldn't see Mr. Davenport at his office; they would say you will find him at "various times;" I did call at various times, but no Davenport.

Q. Did you vote at the last clection? A. My God no! he intimidated me so I couldn't vote; I couldn't vote without my papers.

On cross-examination witness, addressing Mr. Davenport, said, "Be easy on me now." (Laughter.) Was born in Ireland, 1834; my mother told me so; inved at No. 97 Madison street on the day of election; the notice I received I returned to you; cannot describe it; something about you requiring to investigate my papers; you did say to me that you would search for my declaration papers, and if found you would send them to me; but you also said you had no doubs of my paper being right, and that you would send if to me sure in eight days; did not know that my paper was to be cancelled; there was nothing said of that; don't know the contents of the paper; saw the name of John I. Davenport to it; knew it was about the "68 papers; I put it in my pocket and came here; "I know you well, Mr. Davenport, through the public press." "You will know me now personally, "said the Commissioner.

Witness—Oh, as to that, I know you pretty well now. (Laughter.)
Patrick Ryau examined:—Took my '63 papers to

now. (Laughter.)

Patrick Ryan examined:—Took my '63 papers to Commissioner Davenport; made a statement and signed it; was saked if I didn't know it; was voting illegally; I said I did not know it; I was ronaturalized on the 24th of October, 1878, and surrendered my '63 papers on account of what Davenport told me; I was told if I voted I would be arrested; when voting on the 1878 papers was arrested by a marshal; when arrested I resisted; the marshal said he had a warrant for my arrest; he didn't show any warrant for my arrest; he didn't show any warrant for my arrest; he account to the corner of Twenty-seventh street and Seventh avenue; was not brought before a commissioner; they told me not to vote; a crowd followed us, and the marshals told me to go home and not expose myself. (Laughter.)

REFULLICANS ALLOWED TO VOTE.

Thomas Keyworth Anderson came to this country in 1863; his first papers he took out in 1866, and his last papers in 1886; voted regularly up to 1878; was first challenged in 1876; in 1876 received a notice that I should surrender my papers; went to the Superior Court, where I took out my papers, and was informed my papers, first and last, were all correct; took my papers to Davenpert, who wanted them, but I refused to deliver them up; went to vote on election day and was arrested; knew a man of the mane of Piser, who had 1868 papers; saked him if he had voted; he said he had; then I said, "I bet a dollar you voted the republican ticket;" "certainly," he said, "I always do." "I thought so," said witness. (Laughter.)

James R. Angell, United States Commissioner, was

said, "I always do." "I thought so," said witness.
(Laughter.)

James R. Angell, United States Commissioner, was
a member of the republican committee and sat as
united States Commissioner on election day; did not
discriminate in any mancer in his official action in
favor of any persons as against any other persons
brought before him on account of their politics.

After hearing several other cases similar in most
respects the committee adjourned till ten o'clock
this morning.

MR. ERHARDT DECLINES TO VOTE

HIS LETTER ORDERED ON FILE BY HIS COL-LEAGUES IN THE POLICE BOARD-ASSIGN-MENTS AND TRANSPERS OF CAPTAINS-OTHER

BUSINESS TRANSACTED. For three hours the Police Commissioners were in session yesterday, and at adjournment they had recorded on the minutes quite a showing of routine business. It was thought that the submission of result disproved. When Clerk Captain Kip read the communication General Smith calmly moved that it be filed, and on the proposition being put to a vote he was supported by to vote. Previous to this the latter had proposed the rearraignment of various members of the force on when the letter was disposed of the assignment to

when the letter was disposed of the assignment to precencts of the recently appointed captains came up for consideration. After some discussion it was agreed to station Captain Berghold in the Minth precinct and Captain Ryan in the Sixteenith. Captain Allaire, who has been located in the latter precinct, was transferred to the Tenth, and Captain Kennedy was sent from the Ninth to the Thirty-fifth precinct.

A communication from Hernan A. Schumacher, the Consul of the German Empire, was read, in which he called attention to the imprisonment of various German sailors in this city without his inowiedge and in violation of the treaty between the United States and the German Empire. The communication was referred to the Mayor, and the counsel to the Board was directed to furnish formal instructions to guide the force in making arcests, so that the international laws will meet with a proper observance.

bservance.
The following resolution was then passed:— Resolved. That the action of the Board on January 24, in reference to the full pay of contain officers, be and is hereby rescinded.

hereby rescinded.

The payment of the bill of repairs was moved and carried by a vote of three Commissioners, Mr. Erhardt declining to vote.

The settlement of the street cleaning bills was determined on by a like vote.

An application from Inspector Thorne and a number of members of the force for permission to confer on measures to be taken with regard to the salary reduction was cranted.

THE BLISS-BIGLIN FIGHT.

There is quite a breeze stirring in republican

party circles in connection with the legal tournay to which ex-United States District Attorney George Bliss encounters Bernard Biglin, a prominent Custom House republican, with headquarters in the Eighteenth Assembly district. The opening contest brings Chief Deputy Marshal James B. Cosgrove, of the Eighteenth Assembly district, and Chief Deputy Marshal Mark F. Healey, of the Sixteenth district, the Eighteenth Assembly district, and Chief Deputy Marshal Mark F. Healey, of the Sixteenth district, into the brunt of the centest. Colonel Bliss originally brought charges sgainst the marshals for ciaiming and receiving pay for services which were not performed during the last election. Warrants were issued for the arrest of Cosgrove and Healey and some eight or nine of their deputies. The affidavits on which the warrants were issued were sworn to on belief or District Attorney Fiero, but were originally drawn up in the manure of Colonel Bliss, who has since refused to proceed directly in the matter. Yestertay morning Mr. Cosgrove was arrested and brought before United States Commissioner Lyman. Ex-Judge Dittenhoe-for appeared for the accused, who, on stating the case to the Commissioner, said that this was a political fight between two party leaders who were using the machinery of the United States proceedings were forced upon the District Attorney, not instituted by him. On application of counsel the accused was released on his own recognizance tull this morning, which is made a false certificate by which himself and others—deputy marshals—obtained full pay for five days for which no services were performed. The penalty attaching to conviction on this charge is a line of \$1,000 and imprisonment.

Warrants have been also issued for the arrest of Deputy Marshals Alexander H. Dennison, William Guiltoyle, Henry Paddleford, Nathan Koehler, Richard F. Pennen, Coles Raynor and Robert Evans, all acting as deputy marsham in the Eighteenth Assembly district during the election, and for the arrest of Chief Deputy Marshals Alexander H. Dennison, William childyle, Henry Paddleford, Nathan Koehler, Richard F. Pennen, Coles Raynor and Robert Evans, all acting as deputy marsham in the Eighteenth Assembly district during the election, and for the arrest of Chief Deputy Mark F. Healey, acting in the Sixteenth Assembly district during the election, and for the charges against Coagrove and Hesley, the result of which will be p